

which it gives life, and it suffers from all its disabilities; sickness is supposed to be caused by its absence from the body, and the soul may be abducted from it by unlawful means. The human soul is seven-fold, and it seems, at times, as if each was independent, for in certain ceremonies an abode is provided for each. The idea that a man possesses several souls is very old, and in Egyptian religious texts it may be traced back to the period of the earliest dynasties, about six thousand years ago. The number seven is, of course, and always has been, a magical number, and in ceremonies which are intended to do good, as well as those in which the object is to do evil, it plays a prominent part. In Babylonian and Assyrian magical texts we find the seven evil spirits of the deep, and the Mesopotamian underworld possessed seven gates; it must not be forgotten, too, the famous temple of Nebo at Borsippa, which tradition identifies with the Tower of Babel, was built in seven stages.

When we come to discuss Malay gods, we find the subject to be one of some difficulty. In the old religion, which the Malay professed to throw off when he adopted Muhammadanism, his ideas had formulated the existence of a large number of nature powers which closely resemble the Hindu gods found in Brahmanism; and before he adopted these as the objects of his worship, he seems to have peopled heaven and earth with myriads of spirits. To this day, when in trouble, he cries out, not to the Allah preached by Muhammad, nor to the deities which the Brahman religion made known to him, but to the evil spirits which his ancestors worshipped and feared untold centuries ago. It has been the same in all ages and in all countries, and the nations which become "converted" to a new religion in reality only drop the observances connected with their old faiths; and although they may tear down the shrines of old gods and build others to new ones, they do not succeed in uprooting from their minds the beliefs and ideas of which the overthrown shrines were the outward and visible signs. In spite of the teaching of Muhammad and the Brahmans, the Malay still believes that every department of nature is presided over by a "god" who must be propitiated by man, and to be specially honoured and revered are such gods as Bataru Guru, Bataru Kala, Bataru Indra, and Bataru Bismu; the greatest of this group is the first. It is interesting to note that native influence has succeeded in introducing into the Malay pantheon a number of gods of the sea, which from certain aspects are identified with older terrestrial gods. Many of the Jinn, or evil spirits of the Arabs, have been identified with old Hindu spirits, and the view held by the Malay on the importance of such beings may be gathered from the fact that it was believed to be possible to buy them from the Shêkh of the Jinn at Mekka, at prices varying from ninety to a hundred dollars each!

More than three-quarters of Mr. Skeat's volume are occupied with a description of the magic rites which the Malay connects with the various departments of nature, and with the life of man. This is not to be wondered at, for it is clear at a glance that there is no event in his life, however trivial and apparently unimportant, which, unless properly protected by magic rites and ceremonies, may give hostile devils and fiends an opportunity for

doing undreamed-of mischief to the wretched mortal whom accident or design has left unguarded. We regret that we cannot follow Mr. Skeat through his description of birth-spirits and birth-ceremonies, and through the whole period of a man's life from the cradle to the grave, as sketched by him, for our space is exhausted, and the reader can study for himself the curious Malay customs which concern betrothals, marriages and deaths. Many of them have their counterparts in other countries, but not a few are peculiar to the Malay. As we read of them we cannot help wondering how, if the pious Malay fulfils all his religious obligations, he ever finds time to do anything else. It is improbable in these days that many men are found who are able to carry out all the religious performances enumerated by Mr. Skeat, and it is much to be hoped that the influence of the English will drive many of them out of existence. Meanwhile a good and careful record of Malay sorcery, witchcraft and demonology, which is invaluable for the study of comparative religion and folklore, has been given us by Mr. Skeat, and there is no doubt that he has laid anthropologists and ethnographers and Oriental archæologists under a heavy debt of gratitude.

#### THE NANSEN NORTH POLAR EXPEDITION.

*The Norwegian North Polar Expedition, 1893-96: Scientific Results.* Edited by Fridtjof Nansen. Vol. i. *The Jurassic Fauna of Cape Flora, Franz Josef Land.* By J. F. Pompeckj. With a geological sketch of Cape Flora and its neighbourhood by Fridtjof Nansen. Pp. 147; with 3 plates. *Fossil Plants from Franz Josef Land.* By A. G. Nathorst. Pp. 26; with 2 plates. *An Account of the Birds.* By R. Collett and F. Nansen. (London: Longmans, Green and Co., 1900.)

THE second chapter of the first volume of the "Scientific Results" of the Nansen North Polar Expedition opens with a geological sketch of Cape Flora and its neighbourhood by the leader of the expedition. It was a wise determination, on the part of those responsible for the publication of the results, to issue the several articles in English. The policy, too frequently followed, of writing important scientific papers in the language of the country where they are published, tends to place serious obstacles in the way of those who endeavour to follow the researches of Continental investigators. It is narrowness of view, rather than true patriotism, that compels authors to publish their results in languages which cannot be read by the great majority of scientific workers.

The geological investigation of Cape Flora, Franz Josef Land, was undertaken by Dr. Reginald Koettlitz, the geologist of the Jackson-Harmsworth Expedition, during the years 1894-97. Dr. Nansen's residence at "Elmwood," as the guest of Mr. Jackson, during a period of rather less than two months, afforded him an opportunity of visiting the most important localities in company with Dr. Koettlitz; the information he collected bears testimony to the good use which was made of this short visit. Nansen has given us a clear account, accompanied by diagrammatic sketches and photographs, of the geology of Cape Flora. This portion of Franz Josef

Land has the character of a plateau with a basaltic cap, 150 metres thick, composed of sheets of lava arranged in regular and almost horizontal terraces, which present a striking resemblance to the familiar basalt sheets in the cliffs of the Western Isles of Scotland.

From the face of the basalt a talus-slope extends to near the shore-line, where it passes into almost horizontal raised beaches, which occur at approximately the same level on both sides of the Cape, and point to a uniform and recent elevation. The volcanic rocks rest on Jurassic sedimentary strata, consisting for the most part of soft shale or clay containing numerous nodules of hard stone. From a "nunatak" protruding through the glacier, about 600 or 700 feet above sea-level, several fossil plants were found in fragments of shale spread over the surface of the rock within two small areas. The important question as to whether the shale was actually *in situ* and represented the remnant of an interbasaltic bed, or whether it had been broken off from a lower stratum and carried up by the intrusion of igneous material, has not been definitely settled. Nansen is of opinion that the plant-bed was *in situ*, and may be looked upon, therefore, as throwing important light on the age of the basaltic sheets; if this view is correct, the basalt must be assigned, on palæobotanical evidence, to an Upper Jurassic or Lower Cretaceous age. Very little is known as to the Jurassic deposits of Northbrook Island beyond Cape Flora; the beds examined at Cape Gertrude have yielded no fossils beyond fragments of wood and lignite. Nansen inclines to the view expressed by Messrs. Newton and Teall,<sup>1</sup> that the beds at Cape Gertrude were deposited under varying conditions and during oscillations of level; while the argillaceous sediments of Cape Flora, which are more uniform in composition, appear to have been laid down in a shallow sea during a period of comparative tranquillity.

The marine Jurassic fossils collected by Nansen from the rocks of Northbrook Island in the Franz Josef Archipelago are described by Dr. J. F. Pompeckj, whose work bears the stamp of thoroughness and accuracy. An account is given of previous literature relating to the Jurassic rocks of Franz Josef Land, special prominence being naturally given to the description by Mr. Newton of the fossils brought to England by the Jackson-Harmsworth Expedition. Some portions of the Cape Flora strata are fairly rich in fossils, but the fragmentary nature of the material renders accurate determination a matter of considerable difficulty, and in many cases the fragments are indeterminable. Dr. Pompeckj has performed his task with ability, and his conclusions have been arrived at as the result of careful sifting of the meagre evidence at his disposal. A glance at the comparative table of the Cape Flora fossils collected by the Jackson-Harmsworth Expedition and by Nansen shows that in several instances Pompeckj's determinations do not agree with those of Newton; considering the fragmentary nature of many of the specimens, it would be strange indeed if there were no discrepancies in the lists of the two palæontologists.

The fauna, as described by Pompeckj, is represented

<sup>1</sup> *Quart. Journ. Geol. Soc.* vol. liii. (1897), p. 477; *ibid.* vol. liv. (1898), p. 646.

by the following genera:—*Pentacrinus*, *Serpula*, *Lingula*, *Discina*, *Pseudomonotis*, *Pecten*, *Lima*, *Leda*, *Macrodon*, *Amberleya*, *Macrocephalites*, *Cadoceros*, *Quenstedtoceras*, and *Belemnites*. The Ammonites appear to be abundant as compared with other groups, the genus *Cadoceros* being specially prominent as regards both species and the number of specimens.

Of the twenty-six species collected by Nansen, seventeen are new to the region, and five are considered to be new species. As the author points out, his results "differ in no slight degree from those which Newton arrived at from his examination of the Jackson-Harmsworth material." The sedimentary strata of Cape Flora are classed by Pompeckj as Lower Bajocian, Lower, Middle and Upper Callovian.

In the concluding palæo-geographical remarks, attention is drawn to the importance of the Cape Flora fossils as coming from the most northerly development of Jurassic rocks so far investigated. The occurrence of marine Bajocian species demonstrates "the existence of a Bajocian Sea in the north of the Eurasian-Jura continent." The extent of this northern sea cannot be determined, but the Jurassic sediments of Cape Flora afford evidence of deposition in shallow water near the shore-line of an Arctic continent. Neumayr's fascinating theory of climatic zones in the Jurassic period does not receive support from the palæontological results of Pompeckj and Newton; the scanty evidence at present available points to the existence of a decided central European facies in the fauna of Cape Flora, a fact opposed to the conclusions of Neumayr.

The patches of sedimentary rock from which Nansen obtained several fragmentary remains of plants have already been referred to as either portions of strata preserved *in situ*, or conceivably derived from lower strata and carried to a higher level by igneous forces. It is unfortunate that the history of the vegetation which flourished on the site of Franz Josef Land during the Mesozoic period is not represented by more legible records, but we may congratulate Prof. Nathorst on having exercised caution and care in the interpretation of the imperfect documents at his disposal.

Among the genera recognised by Nathorst are the following:—*Cladophlebis* and *Sphenopteris* fragments represent the ferns, small specimens referred to *Podozamites* and *Pterophyllum* may be accepted as evidence of the existence of Cycadean plants: *Ginkgo*, *Czekanowskia*, *Phoenicopsis*, *Feildenia*, *Taxites*, *Abietites*, *Pityanthus* and *Pityostrobus* demonstrated the occurrence of Ginkgoales and Coniferæ.

The fairly numerous examples of small *Ginkgo* leaves are the most interesting fossils dealt with by Nathorst; they enable us to extend the range of the Mesozoic species of this isolated genus, which is to-day represented by the maiden-hair tree of China and Japan. The leaves named by Nathorst *Ginkgo polaris* bear a close resemblance to *Ginkgo digitata*, a species which played a prominent part in the Jurassic vegetation of several regions; the Franz Josef Land specimens are characterised by the small size of the leaves, and may possibly be regarded as a northern variety of the larger-leaved *Ginkgo digitata* of the Inferior Oolitic rocks of East Yorkshire. As regards

the question of geological age, we agree with Nathorst's verdict that the plant-bearing beds must be assigned either to an Upper Jurassic or to a Lower Cretaceous horizon. Several of the plants suggest a comparison with Inferior Oolite species from the rich plant-beds of the Yorkshire coast, and it is not improbable that in the fragmentary fossils from Cape Flora we have the remains of a flora but slightly younger than that which has left abundant traces in the Lower Oolite strata of more southern latitudes. While admitting the danger of attempting to assign an exact geological date to the fragmentary and imperfect specimens, there can be no doubt that they must be referred to a period anterior to the Tertiary, and in all probability they are remnants of an Upper Jurassic flora.

While regretting that the fossils from Franz Josef Land are not more numerous and less fragmentary, we may offer a hearty welcome to the two able palæontological memoirs by Dr. Pompeckj and Prof. Nathorst; these authors, in carrying out their difficult tasks with thoroughness and good judgment, have set a standard of efficiency which promises well for the succeeding volumes of the "Scientific Results" of the Nansen Expedition. A. C. S.

As might have been expected, no birds new to science were obtained during the voyage of the *Fram*; nevertheless, some interesting observations were made on the range and distribution of bird-life in the high north, while naturalists have, apparently for the first time, been made fully acquainted with the early plumage of the roseate gull. In the course of the expedition birds were observed in the highest latitudes in which they are definitely known to be able to exist. During the summer of 1895, when the vessel was between  $84^{\circ}$  and  $85^{\circ} 5'$  north lat., in the neighbourhood of Franz Josef Land, ten species were from time to time observed, although none occurred in any numbers. The one found farthest north was the Fulmar petrel, which was seen in lat.  $85^{\circ} 5'$ ; in the last edition of "Yarrell" the extreme range of this bird is given as  $82^{\circ} 30'$ .

During the summer of 1896, when the *Fram* was north of Spitzbergen, the first herald of returning bird-life was a snow-bunting, which made its appearance on April 25. From the observations made during the same season, it is now evident that to the north of Spitzbergen, between lat.  $81^{\circ}$  and  $83^{\circ}$ , the Arctic Ocean is the resort of large numbers of birds, belonging, however, to comparatively few species. Apparently these consist for the most part of immature individuals, in the first plumage, which spend the summer among the open channels in the ice. The little auk and the ivory gull were among those most numerously represented; Sabine's gull having only been seen on a single occasion. Although swimming birds were by far the most numerous in these high latitudes, shore-haunting species were represented by the ringed plover and the grey phalarope, which were seen running about on the ice by the side of the open water.

The fasciculus is illustrated by an artistic plate of the roseate gull in its first plumage, which is mainly brown on the upper-parts, and therefore quite unlike that of the adult. R. L.

### THE CYANIDE PROCESS.

*The Cyanide Process of Gold Extraction.* By James Park. Pp. viii + 127. (London: Griffin and Co., Ltd., 1900.)

THE great success which has attended the introduction of potassium cyanide for the extraction of gold has created a widespread interest in this chemical process, and given rise to several books and papers on the subject from various authors. When we consider that at one large works 500 tons of gold are treated in twenty-four hours, we understand on what a colossal scale the cyanide method is worked. The process, like many others, has grown up from small beginnings, and it is largely owing to Messrs. MacArthur and Forrest that cyanide of potassium is now successfully applied to the treatment of gold ores in different parts of the world.

It is a most significant sign of the times that men who have been practically engaged in an enterprise are willing to communicate the results of their experience to the public at large, and from the manner in which the literature of the subject is growing, every detail requisite for economic working will soon be widely known and utilised. Therefore, one is not inclined to analyse the text too minutely, with the object of finding small flaws, provided the information is broadly reliable and accurate. It was inevitable that electricity should be brought into play in connection with such an important process, and we find Messrs. Siemens and Halske early in the field, with a method of depositing the gold on lead by means of electrolysis. There are two sides to this subject, as to most others, viz. the economic, or practical as it is termed, and the scientific. Now the former seems to be fairly well treated, but what is wanted is much greater attention to be paid to the latter, as it is possible that, with fuller and more intimate knowledge, potassium cyanide may be equally useful in the treatment of other metals besides gold, especially as it is now so largely used in the electro-deposition of gold, silver, copper, brass, &c. The work under notice has passed through three editions in New Zealand, and this is the first English edition. It is intended for the use of students, metallurgists and cyanide operators. Several new illustrations and tables are added, and the information relating to the treatment of slimes and the analysis of solutions has been greatly extended. It is gratifying to learn that wet crushing and cyanide treatment have been followed with as much success in New Zealand as in South Africa, although the ores are of a complex character.

The arrangement of the contents of the book is admirable. After a brief introduction and a general statement as to the limitations of the subject, the chemistry of the subject is wisely introduced, so that the student is at once brought face to face with the various reactions that occur, and led to see the reason for loss of cyanide, which is sometimes so excessive. Valuable information is given on pp. 10-13 on the action of potassium cyanide on metallic sulphides. A very useful chapter on laboratory experiments will be appreciated by teachers and students of metallurgy, as well as by the chemist and works manager; indeed, a commodious and well-